DOOR ASSEMBLY FOR A SPORT UTILITY OR SIMILAR VEHICLE

BACKGROUND OF THE INVENTION

1. Field of the Invention. This invention relates to the field of door assemblies for sport utility and similar vehicles and more particularly to the field of such assemblies with removable, upper window sections.

2. Discussion of the Background. Sport utility and similar vehicles are very popular. One reason for this is their versatility in that they normally can be easily and quickly modified for different uses and situations. As for example, many such vehicles have parts such as window panels and tops that can be lowered or removed for an open air experience. Additionally, a wide variety of interior and exterior accessories such as consoles and roof racks are also commonly available for them.

Door assemblies in such vehicles come in a wide range of choices. Some of the more popular ones have removable, upper window sections. In use, the window section can be secured in place to the lower door portion to enclose the interior of the vehicle and then completely removed from the lower door portion for an open air experience. Once removed, a problem arises with current designs as to how and where to store the window section. Space is normally at a premium in sport utility vehicles so storing the removed window section, for example, in the rear deck area of the vehicle can undesirably

use up valuable space. Similarly, storing the removed window section on the exterior of the vehicle not only can use up carrying space but also can unduly expose the window section to potential damage from weather and flying debris such as stones. Storing the removed window section at home or otherwise remotely from the vehicle has the obvious disadvantage of not being able to enclose the vehicle if the weather or other conditions should change.

With this and other problems in mind, the present invention was developed. In it, a door assembly is presented that has a removable, upper window section that is storable in a neat and out of the way manner in the lower door portion when not in use.

SUMMARY OF THE INVENTION

This invention involves a door assembly with upper and lower door portions. The upper door portion has a window section with one or more clear panels mounted in a frame member. In use, the entire upper door portion including the frame member and window section can be removed as a unit and conveniently stored in a pocket or cavity in the lower door portion. In the stored position, a cover can be provided over the lower door portion. The cover encloses the lower door portion to keep dust, dirt, and other elements out of the storage cavity and away for the upper door portion in it. The cover can also conveniently serve as an arm rest for the driver or passengers.

In several embodiments, the window section of the upper door portion can be opened for the convenience of the driver and passengers while still mounted above the lower door portion. The window section in one embodiment has a vertically retractable panel and in another, two clear panels are provided that can be slid horizontally to open the window area. A folding or pivoting embodiment of the upper door portion is also disclosed which can be collapsed on itself and conveniently stored in the cavity or pocket of the lower door portion.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side elevational view of a door assembly according to the present invention in use on a sport utility or similar vehicle.

Figure 2 is a side elevational view of the door assembly of Figure 1 showing the upper door portion with its window section mounted above the lower door portion.

Figure 3 illustrates the upper door portion of Figure 2 being removed from the lower door portion.

Figure 4 illustrates how the upper door portion of Figure 3 can be inverted and the supporting leg members pivoted to be flush with the edge of the window panel.

Figure 5 shows the upper door portion in its stored position in the lower door portion.

Figure 6 is a perspective view of the stored, upper door portion of Figure 5 and the arm rest cover that can be used to enclose the lower door portion and the upper door portion stored in it.

Figure 7 is a view taken along line 7-7 of Figure 6.

Figure 8 is a perspective view of another embodiment of the present invention in which the clear panel of the window section is vertically retractable.

Figure 9 is a view taken along line 9-9 of Figure 8 showing the retractable window panel in its up position.

Figure 10 is a view similar to Figure 9 but with the retractable window panel in its down position.

Figure 11 is a view taken generally along line 11-11 of Figure 8 with the window panel shown retracted and its attached handle abutting the lower door portion.

Figure 12 is a perspective view of the window panel of the embodiment of Figure 8 in a partially retracted position.

Figure 13 is a view similar to Figures 9-11 but showing the upper door portion including the window section and its frame member removed from atop the lower door portion and stored in it.

Figure 14 is a view taken along line 14-14 of Figure 10.

Figure 15 illustrates a further embodiment of the window section of the present invention in which it includes two clear panels.

Figure 16 is a perspective view of the embodiment of Figure 15 illustrating how the window section has a frame member that can be folded or pivoted to collapse on itself.

Figure 17 is a plan view of the foldable window section of Figures 15 and 16.

Figure 18 illustrates how the collapsed window section of Figure 16 can be inverted and its supporting leg members pivoted to a flush position.

Figure 19 illustrates the window frame of Figure 18 in its stored position in the lower door portion and a covering arm rest that can be provided.

Figure 20 shows an additional embodiment of the window section which has a single leg member in the rear and is mounted in the front between the inner and outer panels of the lower door portion.

Figure 21 illustrates the embodiment of Figure 20 in its stored position.

Figure 22 is another embodiment of the present invention in which the rear of the window section of the upper door portion is spaced from the lower door portion and inserts are provided to fill in the space.

Figure 23 is a view taken along line 23-23 of

Figure 22.

Figure 24 is an embodiment in which both the front and rear door assemblies have removable upper portions that can be stored within the lower door portions for an open air experience.

DETAILED DESCRIPTION OF THE INVENTION

As shown in Figure 1, the present invention involves a door assembly 1 for a sport utility or other vehicle 2. The door assembly 1 includes an upper door portion 3 with a frame member 5 and window section 7 and a lower door portion 9. The upper door portion 3 as illustrated in Figures 1-3 is removably mounted to the lower door portion 9. In the attached position of Figures 1 and 2, the upper door portion 3 is supported on the lower door portion 9 with the frame member 5 and window section 7 extending upwardly above the lower door portion 9. In one mode of operation as schematically depicted in Figures 1-5, the upper door portion 3 can first be lifted up and removed from the lower door portion 9 (Figure 3). Thereafter, the upper door portion 3 can be inverted (Figure 4) with the leg members 11 pivoted or folded substantially flush with the window or panel edge 13 and the upper door portion 3 then inserted into the lower door portion 9 (Figure 5) for convenient storage.

In the stored position as shown in Figures 5 and 6, the upper door portion 3 including the frame member 5 and window section 7 are preferably entirely received in the storage cavity or pocket 15 (Figure 6). This storage cavity 15 as illustrated extends between the inner and outer panel sections 17 and 19 of the lower door portion 9. An elongated cover 21 can then be provided to sealingly engage over the storage cavity 15 to protect the stored upper door portion 3 from dirt, dust, and other elements. The cover 21 is preferably padded or contoured to also serve as an arm rest. Additionally, the cover 21 preferably has detents such as 23 at either end to aid in holding the cover

21 in place. The detents 23 in this regard can also contact or straddle the ends of the stored lower door portion 3 to help keep the upper door portion 3 securely in place in the lower door portion 9.

As shown in Figures 6 and 7, each leg member 11 in this first embodiment preferably has a substantially U-shape cross section with two sides 11' spaced from each other and a base 11" extending therebetween. In operation as discussed above, the leg members 11 can be folded about the pivotal axes 25 in Figure 4 from respective positions extending away from the window edge 13 to the folded positions shown in dotted lines extending substantially along the window edge 13. In the folded positions, the window edge 13 is preferably received in the U-shape of each leg member 11 (see again Figure 7). The line of the window edge 13 could vary but is shown in Figures 3 and 4 extending substantially straight along an axis 27. The leg members 11 are then movable between positions extending substantially perpendicular to the axis 27 (Figure 4) and folded positions extending substantially parallel to the axis 27. The window edge 13 in this regard may have a plastic or other cover member such as 29 on it as in Figure 7 if desired.

In manipulating the upper door portion 3 from the first orientation of Figures 1 and 2 to the second or inverted orientation of Figures 4 and 5, the upper door portion 3 can be moved in any number of manners. Regardless, in the second orientation of Figure 4, the upper door portion 3 has preferably been inverted about a substantially horizontal axis such as 27 from the position of Figure 3. The inverted, upper door portion 3 can then be easily and quickly placed in the stored position of Figure 5 and sealed in place by the cover 21 of Figures 6 and 7.

In the embodiment of Figures 8-14, the operation of the door assembly 1 is essentially the same as in the embodiment of Figures 1-7 except the clear panel 7' of the window section 7 is retractable. In this manner and with the clear panel 7' raised or closed as in Figures 8 and 9, the interior of the vehicle 2 is protected from the elements as in Figure 1. The frame member 5 and window section 7 in this position like the earlier embodiment extend upwardly above the lower door panel 9. However, unlike the earlier embodiment as discussed above, the clear panel 7' of Figure 8 can be retracted or lowered relative to the frame member 5 for the convenience of the driver or passenger. This is illustrated in Figures 10 and 11 in which the retracted panel 7' is shown substantially received in the storage cavity 15 of the lower door portion 9. The clear panel 7' of the window section 7 in this and all the embodiments is preferably made of glass but could be made of plastic or other materials as desired.

Referring again to Figures 8 and 9 and with the panel 7' in the up or raised position, a lock mechanism 31 (see also Figure 12) can be provided to maintain the panel 7' in this position. The illustrated locking mechanism 31 has a simple sliding member or stop 33 that can be moved beneath the glass edge 13 as shown in Figure 9 to keep the panel 7' locked in the raised position. Similarly, the sliding member 33 can be withdrawn as in Figure 10 to allow the panel 7' to be retracted or lowered into the storage cavity 15 of the lower door portion 9. In doing so as perhaps best seen in Figure 12, a clip mechanism 35 can be provided on the top edge 13' of the panel 7'. The clip mechanism 35 has a handle 37 protruding outwardly of the panel 7' and in use, the handle 37 can be manually depressed to

lower the panel 7' as desired. In the fully retracted position of Figure 11, the handle 37 preferably abuts the inner panel section 17 of the lower door portion 9 (see also Figure 12). This serves to keep the panel 7' from moving beyond the predetermined, fully retracted position of Figures 10 and 11. The handle 37 in this regard can be conveniently received in the notch 39 of Figure 12 in the lower door portion 9. Alternatively and if the frame 5 for example extended across the bottom of the upper door portion 3, the notch 39 as well as the locking mechanism 31 could be in this bottom run of the frame member 5 if desired.

Like the embodiment of Figures 1-7, the upper door portion 3 of the embodiment of Figure 8 can be removed from the lower door portion 9 and inverted. Similarly, and with the leg members 11 folded substantially flush along the glass edge 13 (see Figure 13), the upper door portion 3 can be inserted into the storage cavity 15 of the lower door portion 9. Also, like the embodiment of Figures 1-7 and as best seen in Figures 8-11, the lower door portion 9 is preferably provided with substantially U-shaped channel members 41. The members 41 are dimensioned to slidably receive the extended leg members 11 and support the upper door portion 3 atop the lower door portion 9. A mechanism such as the screw 43 in Figures 8-11 can be provided to selectively secure or lock each leg members 11 in place. As illustrated in Figure 14, the screw 43 in each channel member 41 can be advanced against the respective leg member 11. A threaded hole could also be provided in the leg member 11 if desired to receive the screw 43. With the retractable panel 7' of this embodiment, each leg member 11 preferably includes a sealing member such as 45 (see Figure 14) to seal against the retracted panel 7'.

Figures 15-19 illustrate an embodiment of the present invention in which the window section 7 has two, horizontally sliding panels 7' and 7". This embodiment also has a frame member 5 completely surrounding the window section 7. The frame member 5 additionally has two segments 5' and 5" that are pivotally mounted to each other. In use and with the upper door portion 3 mounted on the lower door portion 9 as in the earlier embodiments, the panels 7' and 7" of Figure 15 can be individually slid horizontally as desired. Further and essentially in the manner of the earlier embodiments, the upper door portion 3 can be removed and stored in the cavity 15 (Figure 19) of the lower door portion 9 and enclosed by the arm rest cover 21.

More specifically and with the upper door portion 3 removed from the lower door portion 9 (Figure 15) and the front panel 7' slid rearwardly adjacent the rear panel 7", the frame segments 5' and 5" can be pivoted about the axis 51 relative to each other (Figure 16). In doing so, the segments 5' and 5" are moved from the open position of Figure 15 extending away from each other to the folded position of Figure 16 extending substantially along one another. With the leg members 11 folded to extend substantially along the glass edges 13 of the panels 7' and 7" and along the portions 53 of the frame segments 5' and 5", the inverted upper door portion 3 of Figure 18 can subsequently be inserted and stored in the cavity 15 of the lower door portion 9 (Figure 19) and capped by the cover 21.

Figures 20 and 21 illustrate an adaptation of the door assembly of Figures 15-19 to a common design of a lower door portion 9. In this design, the inner and outer panel sections 17 and 19 of the lower door portion 9 have front pieces 17' and 19' rising up to the upstanding flag member 57. Like

the embodiment of Figures 15-19, the cavity 15 of the lower door portion 9 is widened to accommodate the folded frame segments 5' and 5". However, because the panel sections 17 and 19 have rising front pieces 17' and 19', the front leg member 11 of the embodiment of Figures 15-19 can be deleted if desired. The front frame segment 5' as shown in Figure 20 would then be received and supported atop the lower door portion 9 between the pieces 17' and 19'. As illustrated in Figure 20, the front of the frame segment 5' is received in the channel 59 of the flag member 57 with the bottom portion 53 of the frame segment 5' resting on the support member 61 (see also Figure 21).

In Figures 22 and 23, a door assembly 1 similar to those of Figures 1-14 is shown mounted atop a lower door portion 9 similar to that of Figures 20 and 21 which has rising pieces 17' and 19'. In this embodiment, the lower edge 13 of the window section 7 has a rear portion spaced from the lower door portion 9 creating a gap 63 (see Figure 22). Insert members 65 are then provided that can be slid atop the inner and outer panel sections 17 and 19 of the lower door portion 9 (Figure 23). These inert members 65 on the inner and outer sides of the window section 7 serve to fill in the gap 63. Like the earlier embodiments, the upper door portion 3 of Figures 22 and 23 is removable and can be stored in the lower door portion 9 when not in use.

Although the invention has been primarily shown in a two door vehicle, the removable and storable, upper door portions 3 are equally adaptable for use with front and rear door assemblies as in Figure 24. The same is true for back or tailgate assemblies that are made essentially in the fashion of the illustrated embodiments of the present invention. In this regard and as illustrated with the rear door

assembly of Figure 24, the removable upper door portion of the rear door assembly could have two panels 7' and 7" with their frame member 5 being foldable or collapsible in the fashion of the embodiments of Figures 15-21. This version could have three leg members 11 as shown or simply have two (e.g., the two outside leg members 11) if desired. Alternatively, the panels 7' and 7" could be part of separate upper door portions from each other. It is also noted that the leg members 11 as disclosed above are preferably mounted for pivotal movement to the folded or collapsed positions for storage but could be removable or collapsible in other manners. Additionally, the frame member 5 could be of flexible or foldable materials but preferably is made of rigid ones (e.g., hard plastics or metal). Similarly, the window section could be made of flexible or foldable materials but preferably is made of rigid ones such as glass or hard plastics.

The above disclosure sets forth a number of embodiments of the present invention described in detail with respect to the accompanying drawings. Those skilled in this art will appreciate that various changes, modifications, other structural arrangements, and other embodiments could be practiced under the teachings of the present invention without departing from the scope of this invention as set forth in the following claims.